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UTILIZATION OF FIREMEN'S TIME

What are the advantages and disadvantages of various shift arrangements for firemen? How can firemen's time be more effectively used in related fire department work and in nondepartmental tasks?

One of the major problems confronting many cities is the rising cost of public safety services. The need for more policemen to help curb a steadily increasing crime rate is apparent. The need for more firemen can be seen in many communities which have experienced unusual amounts of building construction and population increase as well as a reduction in the work week for firemen.

This report shows (1) the trends in fire manpower, fire department costs, and the firemen's work week; (2) the advantages and disadvantages of shift arrangements for firemen — 24-hours on, 24-hours off, 10-14, and eight-hour; and (3) the methods devised by cities to use firemen more effectively in nonfire-fighting duties. Data for this report were gathered from information furnished by 74 cities; these cities are listed at the end of this report.

Rising Cost of Fire Protection

The cost of operating a fire department, like most municipal services, has increased steadily over the past six or seven years.

More Firemen. The median number of full-time fire department employees per 1,000 population has risen steadily since 1951 in all population groups.¹ Table 1 shows that in 1951 the median for all cities over 10,000 population was 1.13. Today, the median is 1.40, an increase of 24 per cent.

Table 1

Median Number of Full-Time Fire Department Employees per 1,000 Population: 1951-1957

Population Group	1951	1952	1953	1954	1955	1956	1957
Cities over 500,000	1.40	1.37	1.38	1.43	1.49	1.51	1.49
250,000 to 500,000	1.36	1.32	1.34	1.36	1.45	1.43	1.51
100,000 to 250,000	1.48	1.52	1.55	1.60	1.61	1.66	1.73
50,000 to 100,000	1.38	1.37	1.39	1.48	1.49	1.51	1.55
25,000 to 50,000	1.30	1.31	1.38	1.41	1.50	1.48	1.54
10,000 to 25,000	0.94	1.00	1.06	1.09	1.13	1.18	1.21
All cities over 10,000	1.13	1.17	1.24	1.29	1.31	1.35	1.40

¹The terms "median" and "mode" are used often in this report.

The median is the midpoint for all items arranged from low to high. For example, the 1957 *Municipal Year Book* shows a median of 1.21 firemen per 1,000 population for 501 cities of 10,000 to 25,000 population. This means that one-half of these cities have more than 1.21 firemen per 1,000 population; and one-half have less than 1.21 firemen per 1,000 population.

The mode is the most typical value when items are arranged from low to high. Often it is identical with or close to the median. As shown later in this report, 32 cities reported the number of hours per man per shift for fire training. Eighteen of these 32 cities reported one hour which is the most typical value. In this case the median also is one hour.

Salary Increases. Firemen's salaries like those in other fields of employment have increased steadily in the past decade. Table 2 shows substantial increases in the median entrance salary of firemen in all cities over the past decade.

Table 2

Median Entrance Salary of Firemen, Selected Years: 1947-1957

Population Group	1947	1949	1951	1953	1955	1957
Cities over 500,000 . . .	\$2,389	\$2,979	\$3,171	\$3,687	\$3,950	\$4,350
250,000 to 500,000 . . .	2,112	2,739	3,000	3,438	3,800	3,990
100,000 to 250,000 . . .	2,238	2,642	2,800	3,152	3,441	3,768
50,000 to 100,000 . . .	2,200	2,600	2,766	3,286	3,480	3,858
25,000 to 50,000 . . .	2,184	2,640	2,763	3,227	3,480	3,873
10,000 to 25,000 . . .	2,078	2,431	2,624	3,042	3,300	3,600

The median maximum salary of firemen has increased even more. Table 3 shows that the median maximum salary increase for cities over 500,000 in the last 11 years is nearly \$2,300. For cities under 25,000 the increase is nearly \$1,700. The other population groups have increases within these two figures.

Table 3

Median Maximum Salary of Firemen, Selected Years: 1947-1957

Population Group	1947	1949	1951	1953	1955	1957
Cities over 500,000 . . .	\$2,937	\$3,418	\$3,768	\$4,400	\$4,692	\$5,220
250,000 to 500,000 . . .	2,663	3,120	3,480	4,020	4,300	4,704
100,000 to 250,000 . . .	2,518	3,000	3,160	3,720	4,030	4,441
50,000 to 100,000 . . .	2,412	2,870	3,132	3,594	3,840	4,300
25,000 to 50,000 . . .	2,400	2,950	3,053	3,531	3,814	4,212
10,000 to 25,000 . . .	2,280	2,700	2,838	3,300	3,602	3,960

Shorter Work Week. There are more firemen who are receiving higher salaries and who are working fewer hours per week. According to Table 4 the median work week in 1950 for firemen in all cities over 10,000 population was 72, and 72 hours was the median for all cities under 500,000 population. In 1956 the median work week for firemen in all cities over 10,000 still is 72 but the median has declined from five to nine hours in cities between 25,000 and 500,000 population.

Table 4

Median Hours in Fire Department Work Week: 1950-1956

Population Group	1950	1951	1952	1953	1954	1955	1956
Cities over 500,000	60	60	60	60	60	60	60
250,000 to 500,000	72	67	63	65	67	67	63
100,000 to 250,000	72	71	67	63	63	63	63
50,000 to 100,000	72	72	72	72	72	67	67
25,000 to 50,000	72	72	72	72	72	67	67
10,000 to 25,000	72	72	72	72	72	72	72
All cities over 10,000	72	72	72	72	72	72	72

Table 5 is of even greater significance. In a period of seven years from 1951, 691 cities over 10,000 have reduced the firemen's work week. Table 5 includes some duplication because an undetermined number of cities have made two or more reductions in the work week during this period.

Table 5

Cities Reporting Reduction in Firemen's Work Week: 1951-1957

Year	Total Number of Cities Reporting Reduction	Total Cities over 50,000	Total Cities 10,000-50,000
1951	112	32	80
1952	82	27	55
1953	113	25	88
1954	93	23	70
1955	87	24	63
1956	106	24	82
1957	98	15	83
Total number of cities . . .	691	170	521

Rising Expenditures. More firemen now receive higher pay for fewer hours on duty. Naturally this means higher per capita expenditures. Table 6 shows that since 1950 the per capita total fire department expenditures have increased \$2.79 for all cities over 10,000. Cities in the 100,000 to 250,000 group received the largest per capita increase with \$3.33; followed by cities of 50,000 to 100,000, \$2.90; and cities over 500,000, \$2.82.

Table 6

Total Fire Department Expenditures, per Capita: 1950-1956

Population Group	1950	1951	1952	1953	1954	1955	1956
Cities over 500,000	\$6.10	\$6.11	\$6.44	\$7.25	\$7.15	\$8.19	\$8.92
250,000 to 500,000	4.99	5.65	6.37	6.84	7.24	7.42	7.80
100,000 to 250,000	5.32	5.72	6.38	7.09	7.81	8.28	8.65
50,000 to 100,000	5.09	5.51	5.92	6.81	7.40	7.38	7.99
25,000 to 50,000	4.80	5.06	5.58	6.35	6.92	7.03	7.49
10,000 to 25,000	3.29	3.63	3.92	4.62	5.27	5.37	5.20
All cities over 10,000	5.22	5.46	5.96	6.66	7.05	7.59	8.01

Table 7 shows that the bulk of this per capita increase is for wages and salaries. Since 1950 per capita nonwage expenditures for all cities over 10,000 population have fluctuated from a low of 48 cents to a high of \$1. The percentage of per capita expenditures during this period for salaries constituted 85 to 92 per cent of total per capita expenditures for all cities over 10,000.

Table 7

Fire Department Expenditures for Salaries and Wages, per Capita: 1950-1956

Population Group	1950	1951	1952	1953	1954	1955	1956
Cities over 500,000	\$5.30	\$5.78	\$6.09	\$6.81	\$6.72	\$7.11	\$7.77
250,000 to 500,000	4.52	5.08	5.85	6.17	6.63	6.80	7.12
100,000 to 250,000	4.72	5.19	5.73	6.24	6.88	7.27	7.80
50,000 to 100,000	4.43	4.95	5.44	5.87	6.37	6.47	7.04
25,000 to 50,000	4.21	4.41	4.96	5.45	5.96	5.89	6.20
10,000 to 25,000	2.62	2.89	3.27	3.87	4.41	4.51	4.37
All cities over 10,000	4.55	4.95	5.38	5.97	6.36	6.61	7.01

Number of Building Fires. Yet the question arises as to whether the number of fires has increased in proportion to the increases in expenditures. According to Table 8 the median number of

building fires per 1,000 population has changed very little between 1950 and 1956. For example, cities of 25,000 to 50,000 population experienced a decline from 4.6 to 4.4 building fires per 1,000 population while cities of 50,000 to 100,000 population rose from 3.9 to 4.4.

Table 8

Median Number of Building Fires per 1,000 Population: 1950-1956

Population Group	1950	1951	1952	1953	1954	1955	1956
Cities over 500,000	3.5	3.7	4.0	3.6	3.4	3.3	3.0
250,000 to 500,000	3.4	4.2	4.3	4.0	4.3	4.2	4.7
100,000 to 250,000	4.3	3.9	4.2	4.0	3.9	3.9	4.2
50,000 to 100,000	3.9	3.9	4.4	4.1	3.9	4.2	4.4
25,000 to 50,000	4.6	4.4	4.5	4.5	4.1	4.4	4.4

This should not be construed as a need for less firemen. Better fire-fighting techniques, increased activities in educating the public in the principles of fire prevention, rigid enforcement of fire and building codes, better building construction, and municipal slum clearance programs all can be credited with keeping the ratio of building fires low. Nevertheless these figures indicate that increased fire protection costs are primarily for more firemen working fewer hours for more money.

Firemen are skilled technicians who need and can demand higher wages to keep pace with the rising cost of living. The national movement for a shorter work week abets the firemen's demand for fewer hours. Reduction in effective manpower endangers a city's fire insurance rating.

The result seems inevitable — curtailment of other public services or new and additional taxes — unless other solutions can be found. Some communities have changed the traditional aspects of fire protection and have reorganized public safety services into one integrated department. Compared to the number of cities which have two separate departments, the movement is slight. Nevertheless interest in integration has increased steadily. (See MIS Report No. 165, *A Survey of Police and Fire Integration*).

What of the cities that cannot or do not wish to integrate? What solutions to their problems are available? There are several avenues of action they can take. The arrangement of the fire departments shifts can be studied to determine if manpower is most effectively scheduled. The departmental operations can be surveyed so that efficient and maximum service is guaranteed. Finally, consideration can be given to utilizing some or all departmental personnel for other municipal activities.

Scheduling of Duty Shifts

Fifty years ago, for the average or less than average prevailing wage in the community the fireman would be on duty almost continuously. The one-platoon system required that firemen be on duty for six or more days around the clock with an occasional day off. Later with the two-platoon system the working arrangements were changed so that firemen were given a day off after every 24 hours of duty with perhaps an additional day off every other week. This reduced the total work week to between 72 and 84 hours.

After World War II organized effort was made to reduce the work week further. This resulted in a change from the traditional 24-hour shift to the 10-14 shift where firemen work a 10-hour day for a certain number of days, have several days off, and then work a 14-hour shift at night. Some cities enacted the eight-hour day for firemen.

The 24-hour shift predominates in cities over 10,000 population. The *1957 Municipal Year Book* shows, for 970 cities over 10,000, the 24-hour shift in 730 cities, the 10-14 shift in 216 cities, and the eight-hour shift in 24 cities. Of the 730 cities with the 24-hour shift, 62 schedule 24 hours on, 48 hours off for a 56-hour work week.

While the number of fires and the time it takes to extinguish them differs with each community

and with each fire, firemen do spend more time waiting for a fire than at a fire. During the periods between fires, the fire department personnel are supposed to be engaged in training, drill, and keeping abreast of the latest fire-fighting techniques.

A certain amount of housekeeping must be done such as upkeep of the station, maintenance of the grounds, preparation of meals, and cleaning of dormitories. The equipment and apparatus must be maintained, cleaned, and tested. Inspections must be made to determine that fire codes are obeyed and that correct fire prevention procedures are followed. Other duties may be undertaken such as fire hydrant inspections, painting of fire hydrants, and rescue work.

The information appearing in the following sections was taken from replies received from 74 cities, and most of the questionnaires were completed by fire department officials.

Two MIS reports will help in analyzing fire department shifts and manpower requirements. MIS Report No. 16, May, 1946, *Analyzing Fire Company Manpower Requirements*, presents some basic information on the number of firemen needed to man certain types of apparatus. MIS Report No. 27, October, 1946, *Factors in Reducing the Work Week for Firemen*, is useful in reviewing some of the problems found in the two- and three-platoon systems.

The 24-Hour Shift

The scheduling of firemen for a tour of duty lasting 24 hours followed by one or two complete days off remains the predominant shift arrangement. Even the continuous reduction of firemen work week has not caused any drastic reduction in the number of fire departments under this shift arrangement. In 1951, according to the *Municipal Year Book*, 773 cities reported this shift. In 1957, 730 cities reported its use. The over-all decrease is slight when considering the number of cities which have reduced the work week.

Advantages. The 24-hour shift has several obvious advantages. It is generally suited to municipalities having a longer work week. Most of the cities that use a 24-hour shift have a 63 to 72-hour work week. It can be operated with two platoons and a certain number of relief personnel.

Each platoon is together for a long period of time allowing for better company training and drill. The unit can function effectively as a team because the men are together an average of three times a week.

The fire department under this arrangement is easy to administer, requires a limited number of reserves to handle vacancies for days off, sick leave, and vacation; and allows the men to have time off for rest, relaxation, and outside employment.

Disadvantages. Among the disadvantages cited for the 24-hour shift are that the tour of duty is too long. The firemen are away from their families for a longer period of time than private employment. Because of the long period of time on duty, there is the danger that the men may be called out several times on their tour of duty to hazardous and difficult fires. The long hours make the tour monotonous, and it is difficult to keep the men busy in constructive assignments. Generally, however, the complaints against this shift are that the hours are too long in respect to the total work week. The objections are not so much against the shift as they are against a 63 or 72-hour week.

Actual Work Hours. Firemen may put in long hours on the 24-hour shift, but most of this time is on stand-by duty. When analyzed fully, firemen do not spend more or even the same amount of time in work activities as is done in private employment. That is, they are not actively engaged in work for 40 hours per week.

The information in Table 9 was provided by 36 cities. Not all of these cities reported on every item. The table shows the average number of hours devoted by one fireman on one 24-hour shift to fire training, fire drill, housekeeping, maintenance, fire prevention, and nonfire duties.

Information also was procured on the estimated amount of time a fireman devotes per week to fighting fires, cleaning up property after a fire, and responding to nonfire calls. The answers ranged from a low of one-half hour, five cities; a median of three hours, five cities; and a high of nine hours or more, three cities. The median is three hours.

Table 9

Work Hours for Firemen on 24-Hour Shift

Firemen's Duties	Number of Cities Reporting	Median Hours	Modal Hours	Number of Cities at Mode
Fire Training	32	1	1	18
Fire Drill	32	1	1	22
Housekeeping	32	2	2	15
Maintenance	31	2	2	14
Fire Prevention	32	1	0 & 2	12
Nonfire Duties	18	1	0	5

The median number of hours devoted to departmental and nonfire duties (not including fire fighting) is eight hours on an average shift. If a fireman works three days a week for an average of 72 hours, his actual work week would be 27 hours (including fire-fighting activities).

All of the fire departments reported that firemen are allowed to engage in recreational activities after departmental duties have been performed. All are allowed to sleep while on duty. The normal hours for sleeping are from 8:00 p.m. to 7:00 a.m.

Conclusion: These figures show that with a 24-hour shift a fireman is or can be engaged actively for a work period of eight hours. The hours devoted to fire-fighting activities, of course, cannot be scheduled. Nevertheless, they will not exceed other activities when averaged over a period of time. The actual weekly work hours are less than the 40-hour work week in private industry.

The 10-14 Hour Shift

In the 10-14 hour shift a fireman works a period of 10 hours of day duty, followed by two or more days off, and then a period of 14 hours of night duty. In a few of these cities, the day shift is 11, 12, or 13 hours. This is the second most common shift arrangement. In 1951, according to the *Municipal Year Book*, 211 cities had this type of schedule, and in 1957 there were 216 such cities.

Advantages. This shift works best when applied to a work week of 63 hours or less, especially 56 hours. The personnel will report to the department an average of four times a week. Under a 56-hour week with a 24-hour shift, a fireman could be off duty for as long as five days. The 10-14 hour shift allows a fireman to spend more time with his family, especially in the evening hours. This shift, disregarding the eight-hour shift, is more comparable to the working schedule of industry. A fireman can participate in extended training and drill programs since he has several consecutive days on duty. Frequent rotation in shift assignments lets everyone enjoy daytime and nighttime outside activities.

Disadvantages. A fireman is not always available for emergency because he may be absent from the city on his consecutive days off. In large cities a fireman may spend a larger portion of his off duty time in travel back and forth from home to station. When there are not enough personnel available for relief, on-duty personnel may be under strength. If the department operates under a relatively short work week on a two-platoon system, there is added administrative difficulty in scheduling relief for days off, vacations, and sick leave. A fireman on the night shift is not utilized to his fullest capacities. In fact he generally devotes his night duty time to stand-by activities.

Actual Work Hours. The fireman on the day shift under the 10-14 shift arrangement will put in a normal day's work, but the fireman on the night shift is not called upon too much except for fire-fighting activities. Twenty-six cities responded to the same questions asked of the cities having a 24-hour shift (see Table 10). Not all of these cities reported on every item. The table shows the average number of hours devoted by one fireman on 10-hour day shift and one 14-hour night shift.

Fourteen cities supplied information on the average number of hours per week a fireman on either the day or the night shift spends in fighting fires, cleaning up property after a fire, and responding to nonfire calls. The median is three hours.

Table 10

Work Hours for Firemen on 10-14 Hour Shift

Firemen's Duties	Number of Cities Reporting	Median Hours	Modal Hours	Number of Cities at Mode
<u>Day Shift</u>				
Fire Training	24	1	1	11
Fire Drill	21	1	1	9
Housekeeping	23	2	2	9
Maintenance	19	1	1	6
Fire Prevention	17	2	2	7
Nonfire Duties	16	0	0	16
<u>Night Shift</u>				
Fire Training	15	1	0 & 1	6
Fire Drill	12	0.5	0	5
Housekeeping	13	0	0	7
Maintenance	13	0	0	7
Fire Prevention	5	0	0	4
Nonfire Duties	9	0	0	7

A fireman under the 10-14 shift works a median of seven hours (not including fire-fighting activities) while on the day shift and a median of one and one-half hours while on the night shift. In a two-week period of five, 10-hour days with two days off and five, 14-hour nights with two days off (a 60-hour week), a fireman on the day shift (first week) would actually be engaged in 35 hours of departmental activities plus three hours of fire fighting for a total of 38 hours. In the second week the median would be seven and one-half hours for departmental duties and a total, including fire fighting, of 10 and one-half hours. A fireman would work 48 and one-half hours in a two-week period or approximately 24 hours per week.

In all cities a fireman on the day shift is not allowed to sleep and can only engage in recreational activities after his schedule of duty has been completed. On the night shift he can use his time for recreation, relaxation, and sleep.

Conclusion. The 10-14 shift does have the advantage of giving the men a shorter work week without being forced to have three complete platoons. The day shift under this system is generally kept active during its tour of duty. However, the night shift is utilized only for stand-by. No time is devoted to nondepartmental activities, either by the day or the night shift.

The Eight-Hour Shift

Another basic shift arrangement that is used in a few cities is the eight-hour shift. This shift is advocated in some quarters as being ideal because the firemen's work week corresponds to the work week in private employment. Basically it operates under a three-platoon system with each platoon on duty for eight-hour periods of five or six days. According to the *1957 Municipal Year Book*, there are 24 cities over 10,000 population that have this shift. Montana, because of state statutes, leads the nation in the number of cities with this work schedule.

Advantages. The advantages under this plan are entirely for the fireman. He is given a work week that is comparable to that in industry, but he is not expected to work continuous hours. The fireman is able to adjust his work hours to normal family routine. In cases when the fireman has been assigned to specific nonfire functions while on duty, this shift has aided the city in achieving some savings.

Disadvantages. Most of the recipients of the questionnaire were very frank in their comments on the disadvantages of the eight-hour shift. Number one is that not enough firemen are available to

man the fire apparatus. The cities are not able to support any substantial number of men to make up the deficit caused by the fewer hours on duty.

The shift is costly to maintain because three platoons and a relief force are required to maintain previous standards. If a platoon is not rotated frequently, its men are able to hold full-time outside employment. This is especially true when the men are allowed to sleep on the evening or night shift. The men in the evening or night shift are not utilized except for stand-by fire protection duties. Except in the smaller departments, it is difficult to keep the evening and night shifts actively engaged in nondepartmental functions; consequently the men are allowed to watch television, play cards, and sleep.

Actual Work Week. Only 12 cities responded to the questionnaire on work schedule. The answers are of little statistical value except to report what generally is done in these cities.

The firemen on the day shift generally are kept busy during the tour of duty. They devote approximately one hour a day to each of the following: training, drill, housekeeping, maintenance, and fire prevention. They average two or three hours per week in fire calls.

Very little work is done on the evening shift except, perhaps, an hour each for training, housekeeping, and/or maintenance. Firemen are allowed television privileges. Normally they are not allowed to sleep on duty.

Nothing is done on the night shift in nearly all instances reported. During this period of time the firemen are allowed to sleep.

Some small cities, such as Dormont, Pennsylvania (13,000); Bemidji, Minnesota (10,000); Upland, California (11,000); and Havre, Montana (8,000); use their evening and night shift personnel as police desk sergeants and dispatchers. During their tour of duty, these men are not allowed to sleep.

Conclusions. While the eight-hour shift corresponds to private industry, its costs are prohibitive, and its advantages favors the fireman and not the municipalities. The actual work week is extremely low in comparison to private employment. Only the day shift is utilized fully; little is done with the evening shift; and none with the night shift. Economic savings can be achieved if firemen are assigned to continuous nondepartmental duties. This is done in a few small cities. Otherwise the majority of departmental personnel are engaged for stand-by activities.

Utilization of Manpower

It would appear from the above sections that firemen during their period of daytime duty are kept active in departmental activities. The greatest waste of manpower occurs during evening tour. Because of the inactivity during this period the firemen's actual work week is below that of private industry.

The cities with the 24-hour shift seem to utilize their firemen more than cities with other shifts. This is perhaps due to the long period of time firemen are on duty. Cities on a 10-14 hour shift use their firemen almost entirely for departmental duties. This is understandable when applied to the day shift (they are kept busy on routine activities), but it would seem that better total utilization of manpower could be made.

Since the eight-hour shift is used by so few cities, no real conclusion can be drawn except for the fact that only small departments seem able effectively to use its evening and night personnel in other functions.

The following are suggestions on how firemen may be effectively used to promote economic savings in municipal operations. It should be stressed that using firemen in nondepartmental capacities should be decided by cities on an individual basis. The delegation of such duties should not arouse antagonism within the fire department which would jeopardize the morale and group spirit needed for good teamwork. The duties, themselves, should be of lesser importance to avoid interfering with the performance of the primary job — fire protection.

Departmental Duties. Before assigning a fire department any nondepartmental duties, its operations and organization should be surveyed. The training and drill program should be thorough

enough to guarantee that the men are reasonably prepared to deal with any given situation. The firemen should be responsible for as much of the housekeeping and maintenance work as possible.

Fire prevention and inspection should be developed so that the firemen are allowed to leave their stations for active tours of their areas to note potential fire hazards, building construction, and building access. With the use of a two-way radio and by keeping the men within the vicinity of the fire apparatus, response to calls can be made without loss of time.

Once efficient operations of the department have been achieved and it has been established that there is still a large number of wasted manpower, consideration then can be given to utilizing departmental personnel in nonfire duties.

Maintenance of City Equipment. Some cities reported that firemen engage in minor maintenance and repair of city equipment and property. The equipment is of the type that little skill and training are needed, and the work is not immediately essential to municipal operations. It can be done in the fire station at irregular intervals, and the work can be dropped immediately to respond to fire calls.

One such operation is inspecting, cleaning, oiling, and repairing city parking and water meters. These meters can be maintained on a continuous rotation basis. Edina, Minnesota, and Miles City, Montana, use firemen to repair parking meters. Boulder, Colorado, has its firemen repair water meters.

Preventive maintenance on city-owned vehicles may be handled by the fire department such as washing and cleaning, general inspection, rotation of tires, replacement of minor parts, and checking safety factors. Shorewood, Wisconsin, has its firemen wash police squad cars. In Provo, Utah, the fire department dispenses gasoline to all city-owned vehicles and keeps records for the auditing department.

Other miscellaneous maintenance and repair duties can be performed by the fire department. In Ogden, Utah, firemen do most of the electrical work for all departments in the city including installation and maintenance of all traffic signals and circuits and installation and maintenance of two-way radios and transmitters. In Bakersfield, California, fire personnel maintain the hydrant and fire alarm systems. Painting fire hydrants is done in the Gastonia, North Carolina. In Eau Claire, Wisconsin, firemen are responsible for the repair of municipal furniture and similar property.

Janitorial and Custodial Functions. Some janitorial and custodial duties can be performed when the fire station is located in or near the city hall. In Hillsdale, Michigan, the fire department is located in the city hall and the firemen on duty do the janitorial and minor maintenance work. In Edina, Minnesota, the firemen maintain the city hall, shovel snow off the walks, and mow the lawns. Escanaba, Michigan, and Missoula, Montana, also use firemen for janitorial work.

Building Code Inspection. Some cities use firemen to inspect for violations of building codes and other similar ordinances. This function is well suited to the fire department because the firemen do make building inspections in enforcing the fire prevention program. Likewise, many violations of building or electrical codes may be of concern to the fire department. This function, however, seems best suited for the city which has a separate fire inspection bureau.

In Hartford, Connecticut, fire inspection duty involves all applicable codes and ordinances with referrals to departments having jurisdiction. In Columbus, Ohio; Duquesne, Pennsylvania; and West Hartford, Connecticut; the building code inspections are part of the fire departmental inspection program.

Licensing. Another duty which may be assigned to a fire department is the issuance of minor licenses and tags. The Oakland, California, fire department issues licenses for bicycles, registers voters, and issues fire permits. In Denver, Colorado, the fire department issues bicycle licenses for the police department. Fire personnel in Riverside, California, and Billings, Montana, also perform similar service.

Duties Involving Use of Ladder Equipment. Because firemen have mobile ladder equipment, they can hang flags, repair flag poles, trim outside community Christmas trees, replace light bulbs

in outside poles, and so on. Generally these functions are minor and only occur at infrequent intervals.

In Eau Claire, Wisconsin, firemen are used to replace flag pole rope, replace light bulbs at athletic fields, and trim the community Christmas tree. In Provo, Utah, fire personnel hang flags on all important national holidays. Riverside, California, uses the firemen to hang banners and flags.

Miscellaneous Duties. There are other miscellaneous duties which firemen can perform. For example, Kenosha, Wisconsin, calls upon its firemen occasionally to assist in stuffing envelopes for bulk mailing. In Columbia, South Carolina, the fire department does photo processing for various departments.

Certain semiofficial projects can be handled by the fire department. In Marshall, Missouri, firemen repair and paint Christmas toys which are distributed to orphans and needy children. Augusta, Maine, also reported this activity. In Tacoma, Washington, city firemen built a municipally sponsored float for an annual flower festival.

Conclusions. The fire department first should be surveyed to determine that personnel are being used effectively in their regular departmental functions before considering other duties. As was pointed out previously, firemen used in nondepartmental capacities generally devote about one hour per shift on a 24-hour shift. Very few cities having other shift schedules utilize firemen for such duties.

There are a number of duties at which a fireman can be assigned without jeopardizing the fire protection programs. Using fire personnel for such duties can effect some savings for a city. Some of these duties can be set up under a regular work schedule, while others will exist only for special occasions or for short periods of time.

Summary

Indications are that the cost of municipal fire protection will continue to rise. Many communities are expanding rapidly, and new construction in these areas has to be given such protection. The continued increase in the median number of fire department personnel per 1,000 population, the continuous rise in median entrance and maximum salary schedules, and the decrease in the number of hours on duty indicate that there is no end to increasing cost. At present, approximately 85 per cent of fire departmental expenditures are for salaries and wages. Many cities, because of state legislation or municipal action, are or will experience in the near future additional problems caused by the movement for a 56-hour work week.

An analysis of the various shift arrangements shows that while firemen are on duty more than the usual 40-hour week, the amount of time spent in actual work is far below 40 hours. The major portion of the fireman's time is stand-by duty.

The actual work week for firemen in the 24-hour shift is longer than for any other shift. Its advantages are best when applied to a work week of 63 or more hours. When applied to a 56-hour work week of 24 on and 48 off, the advantages of such a shift are strictly in favor of the firemen. Most of the communities that utilize their firemen for nonfire departmental activities have the 24-hour shift.

The 10-14 shift, often found in cities with an average work week of less than 63 hours, will utilize the day shift most effectively in fire departmental functions. However, it seems that very few communities make effective use of their night shift manpower either in departmental or non-departmental functions. The custom of allowing firemen to sleep on duty and the fact that much of the routine municipal activities are carried on during the day light hours may be the causes for this.

The eight-hour shift is adaptable only for a 40 or 48-hour work week. Its advantages are heavily in favor of the individual fireman. While the firemen on the day shift can be engaged in departmental activities, very little is expected from the evening shift and nothing from the night shift. In small cities firemen can be used as desk-telephone personnel for the police department thus

releasing an extra policeman for patrol duty. In larger cities where there is adequate police personnel, little use is or can be made of the firemen. Men on the night shift are allowed to sleep.

It would seem that the best solution for utilization of manpower in the fire department is to first make effective use of manpower in departmental activities. Firemen should devote all the time that is actually needed for training, drill, housekeeping, maintenance, and fire prevention. When this has been achieved, then consideration can be given to using inactive departmental manpower.

There are minor, routine municipal functions at which firemen can be utilized. The nature of these duties are such that the fire prevention service is not jeopardized. The time that is devoted to such duties averages only about one hour per man per shift. Yet, these activities do effect some savings.

It is difficult to determine whether firemen can be better utilized under the present organization and concept of the fire service. In the interest of better utilization of manpower, consideration should be given to other forms of organization. The integration of the fire department functions and duties as one phase of a greater conception of a public safety program is worthy of consideration. In such a program manpower is fully utilized. Personnel are kept active during their tour of duty, and the work week conforms generally to that which is found in private employment. And finally, there is the additional benefit of more efficiency in operations at less cost. This in turn leads to the following MIS Report (No. 165, *A Survey of Police and Fire Integration*) which reviews the current status of integration in the United States and Canada.

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